# Q Fever *(Coxiella burnetti)*

**(Also known as Query Fever)**

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## 1) THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

Q fever (QF) is caused by *Coxiella burnetii* bacteria. The organism has unusual stability, can reach high concentrations in animal tissues, particularly placentas, and is highly resistant to many disinfectants.

### B. Clinical Description and Laboratory Confirmation

Only about one-half of all people infected with *C. burnetii* show signs of clinical illness. Most acute cases of QF begin with sudden onset of one or more of the following: high fever (up to 105 F), severe headache, general malaise, myalgia, confusion, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhea, abdominal pain and chest pain. Fever usually lasts for 1 to 2 weeks. Weight loss can occur and persist for some time. Thirty to fifty percent of patients with a symptomatic infection will develop pneumonia. Additionally a majority of patients have abnormal liver function tests and some will develop hepatitis. In general, most patients will recover to good health within several months without any treatment. Only 1% to 2% of people with acute QF die of the disease. Chronic QF, characterized by infection that persist for more than 6 months, is uncommon but is a much more serious disease causing significant mortality reaching 65%. A serious complication of chronic QF is endocarditis. Most patients who develop chronic infection have preexisting valvular heart disease or history of vascular graft. Routine laboratory tests may show thrombocytopenia.

Laboratory diagnosis is made by demonstration of the presence of antibodies to *C. burnetii* antigens using IFA methods. Organisms can also be identified in the tissues using immunohistochemical staining or DNA detection methods.

### C. Reservoirs

Cattle, sheep, goats, cats, dogs, wild animals, birds and ticks are natural reservoirs. *C. burnetti* does not usually cause clinical disease in these animals, although abortion in goats and sheep has been linked to this infection.

### D. Modes of Transmission

Organisms are excreted in milk, urine, and feces of infected animals, and most importantly high numbers of organisms are shed in placental tissues and amniotic fluids. The organisms are resistant to heat, drying, and many common disinfectants. Infections of humans usually occur by inhalation of contaminated barnyard dust containing dried placental material, birth fluid, and excreta of animals. Others modes of transmission to humans, including person-to-person spread and ticks bites are rare.

### E. Incubation period

The incubation period of QF depends on the number of organisms that initially infect the patient. Most patients become ill within 2 – 3 weeks after exposure.

### F. Period of Communicability or Infectious Period

Person-to-person transmission is rare; however contaminated clothing may be a source of infection.

### G. Epidemiology,

QF is distributed worldwide and humans are accidental hosts. In the United State, outbreaks have resulted mainly from occupational exposure involving veterinarians, meat processing plant workers, sheep and dairy workers, livestock farmers and researchers at facilities housing sheep. Fewer than 100 cases per year are reported in the United States. The incidence worldwide may be largely unrecognized and underreported.

### H. Bioterrorist Potential

*C. burnetii* is considered a potential bioterrorist agent. If acquired and properly disseminated, *C. burnetti* could cause a serious public health challenge in terms of the ability to limit the numbers of casualties and to control other repercussions from such an attack.

## 2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

### A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

**CASE CLASSIFICATION**

A. **CONFIRMED**

A clinically compatible case **AND**:

- Fourfold or greater change in antibody titer to *Coxiella burnetti* antigen by IFA or CF antibody test, microagglutination, CF, or ELISA tests in acute- and convalescent-phase specimens ideally taken more than 4 weeks apart, **OR**
- A positive PCR assay, **OR**
- Identification of *Coxiella burnetti* in tissues by immunostains or electron microscopy, **OR**
- Isolation of *Coxiella burnetti* from blood (NOTE: hazard to laboratory workers).

**B. PROBABLE**

A clinically compatible case with single supportive IgG or IgM titer as defined by lab testing.

**C. POSSIBLE**

Not used.

### B. Laboratory Testing Services Available

The NJDHSS Public Health and Environmental Laboratories (PHEL) provide preliminary testing for QF. If preliminary tests are positive, arrangements will be made through PHEL for appropriate sample to be sent to the CDC for confirmatory testing. Contact the PHEL at 609.943.9925 or 609.943.4222 for more information.

# 3) DISEASE REPORTING AND CASE INVESTIGATION

## A. Purpose of Surveillance and Reporting

- To help identify the source of infection and prevent further transmission from this source (*e.g.,* an infected animal).
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

## B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C.) 8:57-1.8 stipulates that laboratories report (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting System [CDRS] or in writing) all cases of QF to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located. The health care providers must report all cases of QF to the local health officer having jurisdiction over the locality in which the patient lives.

*Note:* Due to the rarity and potential severity of QF, the NJDHSS requests that information about any suspect or known case of QF, or any suspected exposure to *C. burnetti* **that may be bioterrorist in nature, be immediately reported** to the local health officer where diagnosed. If this is not possible, call the NJDHSS, Infectious and Zoonotic Diseases Program (IZDP) at 609.588.7500 during business hours, or 609.392.2020, after business hours, on weekends and holidays. Such telephone report shall be followed up by a written or electronic report within the 24 hours of the initial report.

## C. Local Health Officer Reporting and Follow-up Responsibilities

1. **Reporting Requirements**

The New Jersey Administrative Code (N.J.A.C.) 8:57-1.8 stipulates that each local health officer must report the occurrence of any case of QF, as defined by the reporting criteria in Section 2 A above. Current requirements are that cases be reported to the NJDHSS IZDP using the CDS-1 form. A report can be filed electronically over the Internet using the confidential and secure CDRS.

2. **Case Investigation**

a. It is the local health officer's responsibility to complete the CDS-1 form by interviewing the patient and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the healthcare provider or the medical record.

b. The NJDHSS IZDP will direct case investigations of New Jersey residents. If a bioterrorist event is suspected, the NJDHSS and other response authorities will work closely with the local health officer and provide instructions/information on how to proceed.

c. The local health officer may be asked to complete an official CDS-1 form. Most of the information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines to complete the form:

1) Be sure to record the patient's full name, full address, date of illness onset, symptoms and therapy information accurately.
2) Complete diagnostic test information.
3) Exposure history: use the incubation period range for QF (2-3 weeks) before onset for the following exposures:
   a. Animal contact, farm visit.
   b. Occupation (*e.g.,* farmer, laboratory worker).
   c. Food consumption history (use of raw milk or unpasterized milk products).
   d. Ticks exposure.
4) Confirm that the laboratory where the culture was identified exercised proper precautions when working with the bacteria. Laboratory workers exposed to *C. burnetti* (*e.g.,* did not use the

protection of a laminar air flow/biosafety hood) should be observed for symptoms and treated if became ill. Consult with the NJDHSS IZDP at 609. 588.7500. Infectious aerosols can occur when manipulation of the isolate is done outside of a biosafety hood.

5) If there have been several attempts to obtain patient information (*e.g.*, the patient or healthcare provider does not return calls or responds to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter collected information into the "Comments" section.**

e. After completing the case report form and attaching lab report(s), these should be mailed in an envelope marked "Confidential" to NJDHSS IZDP, or the report can be filed electronically over the Internet using the confidential and secure CDRS.
The mailing address is:

NJDHSS
Division of Epidemiology, Environmental and Occupational Health
Infectious and Zoonotic Diseases Program
P.O.Box 369
Trenton, NJ 08625-0369

f. Institution of disease control measures is an integral part of case investigations. It is the local health officer's responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4, "Controlling Further Spread."

# 4) CONTROLLING FURTHER SPREAD

## A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.10)

None.

## B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases.

## C. Managing Special Situations

**Reported Incidence Is Higher than Usual/Outbreak Suspected**

If more than one case of QF is reported or suspected in a city or town, or if an outbreak is suspected, the NJDHSS IZDP should be notified at 609.588.7500. The IZDP staff will help to investigate to determine the source of infection and mode of transmission. A common vehicle, such as infected animals or unpasteurized milk products, should be sought and applicable preventive or control measures should be instituted (*e.g.*, removing implicated items from the environment). The IZDP staff can also help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

*Note:* If a bioterrorist event is suspected, the NJDHSS and other response authorities will work closely with local boards of health and provide instructions/information on how to proceed.

**Exposure of a Laboratory Worker**

- Laboratory workers exposed to *C. burnetti* (*e.g.*, did not use the protection of a laminar air flow/biosafety hood), should be observed for symptoms and treated if became ill. Consult with the NJDHSS IZDP at 609.588.7500.

## D. Preventive Measures

**Environmental Measures**

Implicated food items must be removed from the environment. A decision about testing implicated food items can be made in consultation with the IZDP and the Food and Drug Safety Program (FDSP). FDSP can help coordinate pickup and testing of food samples. If a commercial product is suspected, FDSP will coordinate follow-up with relevant outside agencies (e.g., FDA, USDA). FDSP is reachable at 609.588.3123.

*Note:* The role of the FDSP is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control points (HACCP) risk assessment, initiating enforcement actions and collecting food samples.

**Preventive Measures/Education**

To prevent future exposures, advise the following:

- Educate the public on sources of infection.
- Workers at occupational risk (such as farmers, slaughterhouse workers, or laboratory workers) should know the symptoms of the disease, how it is spread, and the risks of handling infected animal carcasses and products. They should know the proper way to reduce exposure, such as ventilating slaughterhouses or handling laboratory specimens carefully.
- Do not consume raw (unpasteurized) milk or milk products.
- Anyone who handles or disposes of placentas, fetuses, and/or discharges from facilities housing goats and sheep should use care and disinfect contaminated areas.
- Restrict access to barns and laboratories used in housing potentially infected animals.
- Vaccinate (where possible) individuals engaged in research with pregnant sheep or live *C. burnetii**.
- Counsel persons at highest risk for developing chronic QF, especially persons with pre-existing cardiac valvular disease or individuals with vascular grafts.

*A vaccine for QF has been developed; however this vaccine is not commercially available in the United States and is only administered to individuals in high risk positions via Investigational New Drug protocols.

# ADDITIONAL INFORMATION

A *Q fever Fact Sheet* is available at the NJDHSS web site at <http://www.state.nj/health>. Click on the "Topics A to Z" link and scroll down to the subject *Q fever*.

The CDC surveillance case definition for QF is the same as the criteria outlined in Section 2A of this chapter. CDC case definitions are used by state health departments and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always refer to the criteria in Section 2 A.

# REFERENCES

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CDC Website. Q fever. Available at http://www.cdc.gov/ncidod/dvrd/qfever/index.htm. Updated February 10, 2003.

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Massachusetts Department of Public Health, Division of Epidemiology and Immunization. Guide to Surveillance and Reporting. Massachusetts Department of Public Health, Division of Epidemiology and Immunization, January 2001.